

REMARKS

This responds to the Office Action mailed on June 15, 2006.

Claims 1, and 3-4 are amended, claim 2 is canceled, and claim 8 is withdrawn from consideration by the Examiner; as a result, claims 1, 3-7, 8 -14, and 24-27 are now pending in this application.

Information Disclosure Statement

Applicants submitted an Information Disclosure Statement and a 1449 Form on December 30, 2003. Applicants received a copy of the initialed 1449 form with the Office Action mailed on June 15, 2006. Applicants want to point out that two references were not initialed by the Examiner (Nolan, US 5,965,257 and Eckblad, US 6,407,922). Applicants respectfully request that an initialed copy of the 1449 Form filed on December 19, 2005 be returned to Applicants' Representatives to indicate that the cited references have been considered by the Examiner. A copy of the returned 1449 is enclosed with this Amendment.

§102 Rejection of the Claims

Claims 1-2 and 10 were rejected under 35 USC § 102(a) as being anticipated by Dani et al. (U.S. 2003/0077478). To sustain an anticipation rejection under 35 USC § 102(a), each and every element in a rejected claim must be taught or suggested in the cited reference.

Regarding claim 1, Applicants amended claim 1 by adding from claim 3 the feature "some of the carbon nanotubes of the plurality of carbon nanotubes are chemically bonded to the solder."

The examiner asserts that Dani et al's Fig. 2 teaches "some of carbon nanotubes are chemically bonded to the solder." Applicants do not agree with the examiner's assertion. Merely from Figure 2 of Dani et al, a person with ordinary skill in the art cannot see whether some of carbon nanotubes are chemically bonded to the solder or not. Furthermore, refer to the literal description of Figure 2 in paragraphs [0022]-[0024] of Dani et al, with emphasis added.

[0022] The whole assembly, including the electronic component 12, the thermally conductive member 14, and the thermal interface material 10, is inserted into a furnace which heats the assembly from room temperature to a temperature above which the solder particles 18 melt. The solder particles 18 fuse and agglomerate together as shown in FIG. 2. Agglomeration is initiated by the fine ones of the solder particles 18. The temperature to which the assembly is heated is, however, maintained below a temperature at which the filler particles 20 melt. The assembly is then cooled to a temperature below the melting temperature of the solder particles 18 so that they solidify.

[0023] The temperature is further lowered to a selected temperature above room temperature at which the matrix material 16 cures. Cross-linking occurs between polymer chains of the matrix material 16 while it is being cured to enhance the viscoelastic properties of the matrix material 16. The matrix material 16 may be non-curable resins such as phase change materials, which crystallize and thereby solidify at room temperatures.

[0024] The temperature is then further lowered to room temperature. In the resulting structure, the solder particles 18 are agglomerated together and have large surfaces contacting both the electronic component 12 and the thermally conductive member 14 so as to provide an unbroken path through which heat can conduct from the electronic component 12 through the now-consolidated solder particles 18 to the thermally conductive member 14. The matrix material 12 has the ability to absorb stresses on the material. However, without the filler particles 20, the thermal interface material 10 may tend to flow out from between the electronic component 12 and the thermally conductive member 14 during thermal cycling and/or when exposed to high humidity. The filler particles 20 provide the necessary strength to prevent the thermal interface material 10 from flowing out from between the electronic component 12 and the thermally conductive member 14 under such conditions. The filler particles 20 thus keep the thermal interface material 10 intact during adverse stress and thermal conditions.

It can be seen that Dani teaches that the solder particles 18 fuse and agglomerate together, but Applicants cannot find that Dani teaches that filler particles 20 (carbon nanotubes) are chemically bonded to the solder particles 18 (solder). Thus, Applicants submit that Dani does not teach “some of the carbon nanotubes of the plurality of carbon nanotubes are chemically bonded to the solder” which is positively recited in amended claim 1. Accordingly, Dani et al does not anticipate claim 1.

Applicants canceled claim 2, since its features have been added to claim 1 by the present amendment.

Claim 10 is dependent on claim 1. Thus, for at least the reasons discussed for claim 1, Dani does not anticipate claim 10.

Therefore, Applicants respectfully request the examiner to withdraw the rejections to amended claim 1, and claim 10 under 35 USC § 102(a).

Allowable Subject Matter

Claims 24-27 were allowed.

Claims 3-7, 9, and 11-14 were objected to as being dependent upon a rejected base claim, but were indicated to be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claims 3-7, 9, and 11-14 directly or indirectly depends on amended claim 1, which, for the reasons stated above, is believed to be allowable. Thus, for at least the reasons discussed for claim 1, claims 3-7, 9, and 11-14 are believed to be allowable.

AMENDMENT AND RESPONSE UNDER 37 CFR § 1.111

Serial Number: 10/747,927

Filing Date: December 30, 2003

Title: NANOTUBE MODIFIED SOLDER THERMAL INTERMEDIATE STRUCTURE, SYSTEMS, AND METHODS

Assignee: Intel Corporation

Page 8

Dkt: 884.863US1 (INTEL)

Conclusion

Applicants respectfully submit that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney ((612) 373-6970) to facilitate prosecution of this application.

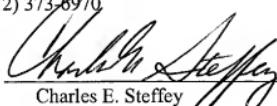
If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

Respectfully submitted,

PAUL A. KONING ET AL.

By their Representatives,
SCHWEGMAN, LUNDBERG, WOESSNER & KLUTH, P.A.
Attorneys for Intel Corporation
P.O. Box 2938
Minneapolis, Minnesota 55402
(612) 373-6970

Date Sept 15, 2006

By 
Charles E. Steffey
Reg. No. 25,179

CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being filed using the USPTO's electronic filing system EFS-Web, and is addressed to: MS Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on this 15th day of September 2006.

Name

Amy Moriarty

Signature

B31